CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2007- 0089

WASTE DISCHARGE REQUIREMENTS FOR UNIVAR USA INC. AND RIVER CITY BASEBALL GROUP RALEY FIELD/FORMER VAN WATERS & ROGERS FACILITY SITE GROUNDWATER TREATMENT AND DISPOSAL SYSTEM WEST SACRAMENTO, YOLO COUNTY

The California Regional Water Quality Control Board, Central Valley Region (hereafter Regional Water Board), finds that:

1. Univar USA Inc. (formerly Van Waters & Rogers, Inc.) submitted a Report of Waste Discharge (ROWD) (April 2005) requesting modifications of its waste discharge requirements dated for its existing groundwater treatment and disposal system. Supplemental information was presented in a 2004 Remediation Enhancement Evaluation Report, and in a December 2005 report entitled SVE Rebound Evaluation Follow-up Response to ROWD Questions. The system is located at its former West Sacramento chemical distribution center property (hereafter referred to as Site) at the Raley Field Ballpark.

2. The Site is on Yolo County Assessor's Parcel Number 058-320-11. The address of record is 400 Ballpark Drive (formerly 850 South River Road) in West Sacramento. The general location of the Site is shown on Attachment A, attached hereto and made part of this Order by reference.

3. The River City Baseball Group is the current owner of the property. Univar USA Inc. and the River City Baseball Group (hereafter collectively referred to as the Discharger) are responsible for compliance with this Order. However, since the River City Baseball Group is the property owner and Univar USA Inc. is the operator of the groundwater treatment system discharging treated groundwater, Univar USA Inc. will be held primarily responsible for day-to-day compliance with this Order. If Univar USA Inc. does not comply, then within 60 days of notification by the Executive Officer, the River City Baseball Group will be required to comply.

4. Van Waters & Rogers, Inc. constructed a chemical distribution facility on the property in 1960. Van Waters & Rogers, Inc. stored, handled, and repackaged chemicals, including tetrachloroethene (PCE), acetic acid, acetone, Texanol (ester alcohol), diesel, 1,1,1-trichloroethane (TCA), and propylene glycol, at the site.

BACKGROUND

5. Site investigative activities were initiated in 1988 in response to potential leaks from four 8,000 and one 4,000-gallon underground storage tanks (USTs) used to store acetone, Texanol, and diesel. The USTs were removed in July 1991 under permits from the Yolo County Department of Public Health and the City of West Sacramento Fire Department. Since removal of the USTs, no chemicals have been stored in bulk at the site.

6. The Discharger operated a soil vapor extraction/air sparge (SVE/AS) system from February 1995 until 1997 to remediate VOCs detected in soil and groundwater beneath the site.

7. Operation of the (SVE/AS) system may have caused groundwater mounding of the water table beneath the facility and exacerbated offsite migration of VOCs. The primary constituents, PCE; 1,1,1-TCA; and cis-1,2-Dichloroethene (cis 1,2-DCE) were detected in perimeter monitoring wells in 1998. The highest on-site groundwater VOC concentrations ranged from 2000 to 3000 ug/L. In 1999, the Discharger decommissioned the air sparging system and proposed a combination of SVE, groundwater extraction, GAC treatment, and enhanced in-situ bioremediation as the preferred remedial alternative for the site.

8. On 16 June 2000, the Regional Water Board adopted Waste Discharge Requirements (WDRs) Order No. 5-00-131 authorizing enhanced in-situ bioremediation, including extraction, treatment using liquid-phase granular activated carbon (GAC), and injection of groundwater amended with a food source (organic/carbon substrate as sodium lactate) and nutrients to stimulate the growth of indigenous bacteria to remediate groundwater containing volatile organic constituents (VOCs) at the site. The operation of the groundwater treatment and extraction system also served to contain the existing groundwater pollution.

9. Since September 2000, the Discharger has operated an enhanced in-situ bioremediation groundwater treatment and disposal system that injected extracted groundwater into a treatment zone using five groundwater extraction (gradient control (GC)) wells, two combination gradient control/vapor extraction (GCVE) wells, and three injection trenches (Trenches 1, 2 & 3). Extracted groundwater was treated using three above ground liquid–phase GAC units. Associated piping and instrumentation was used to inject treated unamended groundwater outside the in-situ treatment zone for hydraulic control and to re-inject amended groundwater within an in-situ treatment zone to provide enhanced degradation of VOCs. The Site,

the groundwater re-circulation system, and the monitoring well network is shown on Attachment B, attached hereto and made part of this Order by reference.

10. After demonstrating that hydraulic capture was achieved in the treatment area using the groundwater pump and treat recirculation system, the Discharger was allowed to inject untreated (i.e. groundwater containing VOCs) into the treatment zone to further enhance the effects of in-situ bioremediation at the site. Since 2000, the Discharger also continued to operate the SVE portion of the system consisting of five vapor extraction (VE-1R, VE-2R, VE-3R, VE-6, & VE-7) wells and the GCVE wells.

11. The Discharger amended the extracted groundwater with sodium lactate, nutrients (potassium phosphate), and anaerobic bacteria (microorganisms), to enhance the growth of indigenous (i.e. native to the Central Valley or San Joaquin-Sacramento River Delta areas of California) anaerobic bacteria capable of breaking down the VOC contaminants to carbon dioxide, water, and chlorides via a reductive dechlorination process. Total concentrations of up to 215 mg/L sodium lactate (daily average) and up to 40 mg/L potassium phosphate (daily average) were added to extracted groundwater for injection to break down the VOC contaminants. In the event that the breakdown to carbon dioxide, water, and chlorides was not sufficiently enhanced, the remedial system also functioned as a groundwater extraction, treatment, and capture system.

12. The regional groundwater flow direction in the area of the Site is influenced by the stages of the Sacramento River. The significant changes in the river stage have historically occurred on a seasonal basis (i.e. early winter and spring). Depth-to-water measurements were made in the site monitoring wells during these changes in river stage to confirm whether groundwater flow direction change also occurred. The Discharger operated the groundwater treatment and disposal system using two main extraction/injection configurations to provide effective hydraulic capture and recirculation of groundwater during the southeasterly regional flow conditions (groundwater flows toward the Sacramento River) and during northwesterly regional flow conditions (groundwater flows away from the Sacramento River).

13. In November 2002, the Regional Water Board approved an increase in the nutrient injection from a maximum of 10,000 pounds sodium lactate per year to 30,000 pounds per year. The GC-7 and GC-8 wells were allowed as injection points, during a northwest groundwater flow regime, and GC-9 during a southeast flow regime, for treated and amended groundwater, in

addition to the injection Trenches 1 and 2. Trench 3 continued to be used as an injection point for the discharge of treated water with no amendments. GC-5 continued to be used as a year round groundwater extraction point.

14. Site groundwater monitoring activities have been performed as required by Monitoring and Reporting Program (MRP) No. 5-00-131, adopted 16 June 2000, and then as required by a revision of MRP No. 5-00-131, effective on 30 March 2005. In addition to monitoring groundwater flowing to the groundwater treatment system, the Site currently has a network of 22 groundwater monitor wells to assess water quality in two water bearing zones, as shown on Attachment B. A majority of the wells, including the GC wells, are screened in the upper hydrostratigraphic zone at various intervals from 9 to 60 feet below ground surface (bgs). Only seven groundwater monitoring wells (MW-5D, MW-6D, MW-7, MW-13, MW-14, MW-15, and MW-21) are screened in the lower hydrostratigraphic zone and at varying intervals from approximately 75 to 147 feet bgs.

15. Groundwater system sampling data indicate that groundwater quality has been significantly improved at the site over the past four years. Overall, remedial system groundwater influent total VOC concentrations have decreased since system start-up in September 2000 (1,582 micrograms per liter (ug/L) through November 2005 (89 ug/L). Although there have been some variability in the data, the overall VOC concentrations in the shallow groundwater monitoring wells continue to show a decreasing trend.

16. Analytical data from operation of the initial air sparging/vapor extraction system operated in the 1990's and the 2005 rebound testing indicate that soil vapor has been remediated, with relatively low concentrations of VOCs remaining in the vadose zone soil at the site. Overall, soil vapor concentrations have been reduced from the average system influent concentration of 39.73 ug/L total VOCs in August 1996 to an average influent concentration of 0.19 ug/L total VOCs collected during 2005 rebound testing. Additional soil vapor sampling data collected in 2006 indicate that less than 4 ug/L total VOCs, as tetrachloroethene (PCE), t-1,2 dichloroethene, and vinyl chloride, compared to vapor concentrations of above 100 ug/L PCE detected prior to system operation, remain beneath the former eastern facility boundary.

17. Evaluation of historic groundwater data demonstrates that most of the significant groundwater quality improvements occurred during the first few years (2001 and 2002) of system operation. Most of the mass of VOC pollution remains in groundwater in the upper hydrostratigraphic zone where total VOC concentrations above 100 ug/L are reported to remain in three

relatively discrete areas of the site. These three main areas are in the vicinity of wells MR-3 and MR-7, GCVE-1, and MW-7 and GCVE-2. In 2004, the Discharger conducted a Remediation Enhancement Evaluation, including groundwater modeling, to assess options for further system operation adjustments to expedite degradation in these areas while maintaining capture.

REMEDIATION

18. Pre-system start-up data (July and November 2000) compared to the most recent 2005 data shows that current in-situ conditions are conducive to degrading PCE and TCE to cis-1,2-DCE, and past VC, to ethene and ethane. VC, ethene and ethane were not detected in groundwater at the site prior to system start-up. Since system start-up, these constituents have been detected and their concentrations have increased in a number of wells. Nitrate and sulfate concentrations continue to show depletion across the site indicating that anaerobic conditions are being maintained. Site groundwater pH has remained near neutral for the past year and chloride concentrations have also not generally increased.

19. The Discharger proposes to continue the extraction and injection of groundwater amended with sodium lactate or ethyl lactate, potassium phosphate, and anaerobic bacteria to stimulate reductive dechlorination process. During reductive dechlorination, anaerobic microorganisms substitute hydrogen for chlorine on the organic compound. The chlorinated VOC is the electron acceptor and carbon is the main electron donor. PCE is reduced to trichloroethene (TCE), then cis-1,2-DCE, then VC, then ethene. Injecting a food source to stimulate growth of indigenous anaerobic microorganisms provides a carbon substrate, accelerating the reductive dechlorination process.

20. PCE and TCE degrade best under anaerobic conditions, but cis-1,2-DCE and VC can be difficult to degrade under anaerobic conditions. Low concentrations (less than 100 ug/L) of these VOCs may not be able to support viable populations of dechlorinating microorganisms (suffocation). Despite this, cis-1,2-DCE and VC are expected to be reduced by the indigenous microorganisms once the PCE and TCE are reduced because it will be the next available source for the anaerobic microorganisms to substitute hydrogen for chlorine. In the event that the breakdown to carbon dioxide, water, and chlorides is not sufficiently enhanced under these anaerobic conditions, anaerobic conditions will be further stimulated using a second mode of system operation, or aerobic conditions will be created using a third mode of system operation. During this process, the remedial

system will also continue to function as a groundwater extraction, treatment, and capture system.

21. The Discharger proposes to extract up to 125,000 gallons of groundwater per day (up to 90 gallons per minute (gpm)). All or a majority of the extracted groundwater will be treated using granular activated carbon. Up to 110,000 gallons per day (up to 60 gpm) of the treated groundwater will be un-amended and re-injected outside the treatment zone. The Discharger proposes to amend and inject a combination of treated and untreated groundwater of up to 15,000 gallons per day (up to 30 gpm) within the in-situ treatment zone.

22. The treatment area includes a treatment zone and a transition area which consists of the groundwater recirculation system using gradient control wells (GCVE-1, GCVE-2, GC-5, GC-6, GC-7, GC-8, & GC-9), injection trenches (Trench 1, Trench 2, and Trench 3) and the VE injection wells located directly above the layout of the former VW&R Facility. The treatment zone boundary is defined by the former VW&R property boundary (as shown on Attachment B). Performance of the recirculation system will be assessed by the decline of VOC concentrations in the groundwater monitoring wells inside and along the boundary of the treatment zone. A transition area (as shown on Attachment B) that immediately surrounds the treatment zone is expected to continue to exist, where concentrations of metals constituents, such as iron and manganese, are mobilized from the treatment zone. Outside the transition area, where conditions will remain oxidizing, metals concentrations are expected to remain unchanged. It is expected that increased concentrations of amendments and by-products will either be completely consumed or remain at relatively low residual concentrations within the transition area. The Discharger will demonstrate that continued containment and cleanup is being achieved within the treatment area by measuring groundwater levels and constituent concentrations in compliance monitoring wells, as required by the attached MRP No. R5-2007-0089.

23. The Discharger will continue the extraction of groundwater and the discharge of treated groundwater, combinations of treated and untreated amended groundwater, until the VOCs have been reduced below cleanup goals or the system is no longer effective at reducing VOC concentrations in the treatment area. The Discharger will also implement a Remedial Action Plan (RAP) to further demonstrate that aquifer cleanup goals have been achieved for all site groundwater.

24. The Discharger proposes to use the inactive vapor extraction wells as additional groundwater injection points. As shown on Attachment C, which is

attached hereto and made part of this Order by reference, the Discharger will inject amended groundwater into the five existing VE wells installed in 1999 (VE-1R, VE-2R, VE-3R, VE-6, & VE-7). These wells generally terminate at the water table or approximately 5 to 7 feet above the water table. A continuous low rate of injection (range of approximately one gallon per minute) is proposed at these locations to percolate amended groundwater through the vadose zone (0 to 7 feet) and reach the water table. This low injection rate is not expected to affect groundwater capture. Use of the VE wells as injection points is expected to improve the distribution of amendments in the treatment zone and enhance the groundwater remediation.

25. The Discharger proposes to continue to operate the recirculation system in two main extraction/injection configurations depending upon the regional groundwater flow regime. In addition to the injection trenches and VE wells, wells GCVE-1, GCVE-2, and the GC wells will be used as injection points during portions of the year when these wells are not being used for groundwater extraction, with the exception of GC-5 where year round extraction is proposed to continue. These wells are located within the capture zone of the active extraction wells during the proposed time periods when the wells are being utilized for amendment addition. Trenches 1 and 2 will continue to be used as amendment injection points. Trench 3 will continue to be used as an injection point for the discharge of treated water with no amendments.

26. The Discharger will inject amended groundwater into the treatment zone by one or more of three modes: 1) adding appropriate doses of organic substrates and nutrients along with anaerobic bacterial augmentation (Finding Nos. 28 and 29) to extracted groundwater prior to injection into the treatment zone; 2) adding appropriate batches of nano-scale zero valent iron (NS-ZVI) as a slurry consisting of dilute iron, propylene glycol, and water (Finding Nos. 33 and 34) to extracted groundwater prior to injection into the treatment zone; and 3) adding appropriate doses of dissolved methane/propane and oxygen in the form of dilute hydrogen peroxide or pure oxygen (Finding No. 36) to the extracted groundwater prior to injection into the treatment zone.

27. The Discharger will initially use the first mode of operation in a manner consistent with the amounts described in Finding Nos. 28 & 29 and will only be allowed to alter the mode of operation upon receiving written approval of the Regional Water Board staff. The Discharger may inject untreated groundwater (i.e. groundwater containing VOCs), and untreated amended groundwater, into the treatment zone only if the discharge is expected to

enhance the in-situ treatment zone performance and the Discharger has demonstrated that groundwater capture within the treatment zone area can (or will) be achieved. Prior to implementing this first mode of system operation, the Discharger will collect baseline sampling as described in Finding No. 45.

28. Under the first mode of operation, the Discharger will inject a mixture of electron donor (sodium lactate or ethyl lactate) to further promote the breakdown of the VOCs through anaerobic dechlorination. The Discharger will amend combinations of treated and untreated groundwater with approximately 30,000 to 60,000 pounds (as pure material) per year (82 to 164 lbs/day) of an electron donor (sodium lactate or ethyl lactate as 60% syrup) and approximately 200 pounds per year of potassium phosphate. The sodium lactate is a fatty acid salt and is a common food preservative, and the ethyl lactate is an ether that commonly used as a solvent agent.

29. Under the first mode of operation, the Discharger proposes to add amendments as lactate (organic substrates) in total concentrations of up to 600 mg/L (daily average), based on an injection rate of approximately 16 gpm during southeasterly groundwater flow, and up to 900 mg/L (daily average), based on an injection rate of approximately 27gallons per minute (gpm) during northwesterly groundwater flow, to the extracted groundwater prior to injection in the treatment zone to provide a food source for the indigenous bacteria. Indigenous microbes should reduce the added organic substrates to carbon dioxide and water. Up to 40 mg/L potassium phosphate (daily average) may be added as a nutrient and used as an electron donor in the organic substrate breakdown. Anaerobic bacteria (ethenogen microorganisms) will also continue to be added to the amended groundwater to augment native bacteria in breaking down the contaminants.

30. Indigenous, naturally occurring anaerobic bacteria capable of breaking down the contaminants may be added to the groundwater amendment mixture. Introduced anaerobic bacteria, the same type as the indigenous, may be produced on-site or obtained by the Discharger from a supplier outside the region or state. The addition of organic substrates and nutrients has apparently been effective in supporting anaerobic bacteria at the site. Ambient conditions should return upon termination of amendment addition, resulting in the ultimate reduction or elimination of introduced bacteria.

31. Groundwater modeling conducted as part of the 2004 Remediation Enhancement Evaluation demonstrates that a new extraction well between injection trenches 1 and 2 could improve amendment distribution in the upper hydrostratigraphic zone along the north-south plume axis between

wells GCVE-1 and GCVE-2 under the first mode of operation. The Discharger proposes to install a new extraction well, GC-10, depending upon the progress of site-cleanup observed in the treatment zone under the first mode of operation.

32. In the event that total VOC concentrations above 100 ug/L remain in groundwater in the area between wells GCVE-1 and GCVE-2, the Discharger may install a new shallow zone extraction well in the area between Trench 1 and Trench 2 as part of the recirculation system. Once installed, the Discharger proposes to operate this new extraction well (GC-10) at an extraction rate of 10-30 gpm during both southeasterly and northwesterly flow configurations to enhance the amendment distribution and contaminant breakdown process. The Discharger will collect groundwater samples from GC-10 immediately following well development.

33. As a second mode of operation, to further enhance the anaerobic dechlorination process, the Discharger proposes to add appropriate doses of NS-ZVI to the recirculation system depending upon improvements in water quality within the treatment zone resulting from the first mode of operation. NS-ZVI is a strong reducing agent. Electrons are released during NS-ZVI oxidation to further reduce chlorinated compounds. A NS-ZVI slurry consisting of dilute iron and propylene glycol will be added to treated and untreated groundwater to stimulate reducing conditions.

34. The anaerobically dechlorinated by-products are expected to be intermediate. In the event that total VOC concentrations or daughter-product chlorinated hydrocarbon concentrations persist in groundwater in the vicinity of wells MR-3, MR-7, MW-7, GCVE-1, or GCVE-2 under the first mode of operation, and upon written approval of the Executive Officer, the Discharger may add up to 10,000 pounds per year (using 500 to 1,000 kilogram batches) of NS-ZVI to extracted groundwater prior to re-injection into the treatment zone to further reduce VOC concentrations in groundwater within the treatment zone as much as possible under anaerobic conditions. Prior to implementing this second mode of system operation, the Discharger will collect baseline sampling as described in Finding No. 45.

35. Because low concentrations of some constituents degrade better under aerobic conditions, a third supplemental mode of operation may also be needed to enhance biodegradation to achieve groundwater cleanup goals at the site. Injection of air and dilute hydrogen peroxide introduces oxidizing conditions. Under aerobic conditions, the low VOC concentrations remaining at the site will not affect the viability of the degrading

microorganisms, as often occurs under anaerobic conditions, since under aerobic conditions the microorganisms do not directly metabolize VOCs. Instead, the VOCs are oxidized by the methane/propane monooxygenase enzyme that is generated by the microorganisms. Thus, a healthy population of oxidizing methanotrophic and propanotrophic microorganisms can be maintained aerobically by feeding them methane/propane regardless of the VOC concentrations.

36. In the event that total VOCs or the daughter-product chlorinated hydrocarbons, including but not limited to TCE, cis-1,2-DCE, and VC, persist at concentrations deemed to low to sustain further degradation by anaerobic dechlorination in a particular area of the treatment zone, the Discharger will cease adding electron donor amended groundwater in that area. Upon written approval of the Executive Officer, under a third mode of operation, the Discharger may add appropriate doses of methane/propane enriched groundwater at concentrations of 20 to 40 mg/L, and oxygen in the form of dilute hydrogen peroxide (less than 0.25%) or pure oxygen, to the recirculation system to change the subsurface condition in that area of the treatment zone to aerobic. This will allow for continued degradation of the VOC pollution. Prior to implementing this third mode of system operation, the Discharger will conduct microcosm tests to demonstrate that the proposed change in operation is applicable to the proposed area of site groundwater and that it is expected to be effective in expediting groundwater cleanup. Prior to implementing this approved third mode of system operation, the Discharger will collect baseline sampling as described in Finding No. 45.

OTHER

37. The Discharger states that addition of groundwater amendments under the proposed modes of operation should not change the hydraulic characteristics of the aquifer, but should change the hydraulic characteristics of contaminants.

38. The groundwater extraction and injection system is designed to capture VOCs and any daughter-product chlorinated hydrocarbons or by-products created in the treatment zone by the contaminant breakdown process. Groundwater monitoring wells are installed at the perimeter of the site to demonstrate that site contaminants, daughter-products, and by-products remain in the treatment zone and transition area.

39. The dechlorination process causes a reduction in pH due to the release of hydrochloric acid. The breakdown of lactic acid to acetate also generates

some acidity through the formation of carbonic acid. If the acidity generation exceeds the soil buffering capacity, then the pH of the groundwater may fall below 6.2 inhibiting the dechlorination process. The Discharger will monitor the pH on a regular basis to observe any pH changes. The Discharger will adjust the amendment doses to maintain a generally neutral pH (above 6.3) to ensure that active dechlorination continues. The Discharger will need to verify as part of on-going monitoring that any significant related pH changes, occur within the treatment zone, and are transient in nature. Discharge specifications for pH in this permit may be re-evaluated depending on pH measured in future on-site groundwater monitoring.

40. The contaminant breakdown process is expected to produce biochemical changes in the subsurface, including an increase in chloride ions, metals and other by-products, in addition to breakdown daughter –product chlorinated hydrocarbons, in the groundwater within the treatment zone and transition area. It is reasonable and appropriate that groundwater monitoring be conducted by the Discharger to demonstrate that metals and other indicator constituents return to background conditions or baseline concentrations within the treatment area. Background groundwater chloride and metals concentrations have not been determined. Further monitoring may be necessary to determine background levels if a significant increase from baseline concentrations is detected. Since system operations began, chloride concentrations have remained relatively stable in the on-site monitoring wells at or near 25 mg/L which is below the maximum original baseline concentration of 48 mg/L collected prior to initial system start-up.

41. In order to evaluate the effectiveness and ultimate success of the proposed remedial enhancements, the Discharger will collect samples prior to implementing any new mode of operation set forth in this Order to establish baseline concentrations for comparison with future monitoring results. The Discharger will collect samples to assess the baseline concentrations of contaminants, ions, metals, daughter –product chlorinated hydrocarbons, and other by-products, as described in more detail in Finding No. 45. The effluent limitations set forth in this Order may be re-evaluated and this Order may be re-opened to include additional effluent limits depending on future site groundwater monitoring results as compared to baseline concentrations for these constituents.

42. The Discharger shall begin the long-term performance evaluation by collecting effluent samples and analyzing the samples for Analytical Suite A, B, C, and D constituents, pH, specific conductance, and temperature and associated analytical methods listed in MRP No. R5-2007-0089. The

Discharger shall collect the samples after the groundwater exits the lead treatment vessel and again after exiting each subsequent canister, just prior to discharge to the infiltration pipeline. The Discharger shall complete a change-out of both the primary and secondary vessels once VOC breakthrough occurs in the secondary vessel. Effluent samples should be representative of the volume and nature of the discharge.

43. As part of the overall site remedial evaluations, the Discharger will continue to evaluate groundwater flow conditions on a regular basis, and VOC, amendment, and microbiological breakdown indicator parameters as listed at variable monitoring frequencies as required in the attached MRP No. R5-2007-0089. The Discharger will continue this sampling program until the constituents monitored in groundwater have been reduced below cleanup goals, as described in Finding No. 53, or have returned to within baseline concentration ranges, or the Site is deemed closed by the Regional Water Board pursuant to successful implementation of the final RAP, as described in Finding No. 44.

44. The remedial activities proposed in this Order will also be referenced in the RAP submitted by the Discharger to the Regional Water Board. The RAP will be designed to demonstrate that groundwater cleanup has been achieved at the Site. The RAP will address any distal VOCs detected at the Site by optimizing the groundwater treatment and extraction system or by implementing a different remedial approach, which may include monitored natural attenuation in some areas. Pursuant to the final RAP, the Discharger will clean up any distal VOCs, daughter-product hydrocarbons created in the treatment zone, unacceptable residual concentrations of electron donors, other additives and their breakdown products (including potassium and sodium) and any other contaminants created by the contaminant breakdown process, as necessary, to demonstrate that all Site groundwater meets the cleanup levels, as set forth in the RAP.

BASELINE SAMPLING

45. Prior to using any new mode of operation set forth in this Order (Finding No. 26), the Discharger will collect groundwater samples to assess site condition baseline concentration ranges for contaminants, ions, metals, daughter – product chlorinated hydrocarbons, and other by-products, at least two to four weeks prior to the injection of any increased amounts of any organic substrates, nutrients, anaerobic bacteria, NS-ZVI, dissolved methane/propane or oxygen, and at the same time, will conduct the routine groundwater monitoring as required by the attached MRP No. R5-2007-0089. The baseline groundwater samples will be collected from

the gradient control wells and all Site monitoring wells as shown on Attachment B.

REGULATORY CONSIDERATIONS

46. The injection of chemicals into waters of the State is subject to regulation under the California Water Code. This Order authorizes the Discharger to: (1) discharge granular activated carbon (GAC) treated groundwater, either un-amended or amended with sodium lactate and potassium phosphate along with anaerobic bacteria; (2) discharge treated groundwater amended with NS-ZVI as a slurry consisting of dilute iron, propylene glycol, and water; (3) discharge treated groundwater amended with dissolved methane/propane and hydrogen peroxide; or (4) discharge untreated amended groundwater containing low levels of VOCs, into groundwater subject to specific discharge requirements.

47. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives (WQOs), contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Water Resources Control Board (State Board). Pursuant to Section 13263(a) of the California Water Code, waste discharge requirements must implement the Basin Plan.

48. Surface water drainage is to the Sacramento River within the legal boundaries of the Sacramento – San Joaquin Delta. The beneficial uses of the Sacramento – San Joaquin Delta are municipal and domestic supply; agricultural supply; industrial process and service supply; water contact recreation; noncontact water recreation; warm and cold freshwater habitat; migration of warm and cold freshwater species; spawning of warm freshwater species; wildlife habitat; and navigation.

49. The beneficial uses of underlying groundwater are municipal and domestic supply, agricultural supply, and industrial process and service supply.

50. Surrounding land uses are commercial and residential.

51. State Water Board Resolution No. 92-49 (hereafter Resolution No. 92-49) requires the Regional Water Board to require actions for cleanup and abatement of discharges that cause or threaten to cause pollution or nuisance to conform to the provisions of State Water Board Resolution No. 68-16 (hereafter Resolution No. 68-16) and the Basin Plan. Pursuant to Resolution No. 92-49, the Regional Water Board shall ensure that

dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or if background levels of water quality cannot be restored, the best water quality that is reasonable and complies with the Basin Plan, including applicable WQOs.

52. Resolution No. 68-16 requires the Regional Water Board in regulating discharges to maintain high quality waters of the state until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and potential beneficial uses, and will not result in water quality less than that described in plans and policies (e.g., quality that exceeds WQOs). Temporal degradation of groundwater may occur at this site within the defined treatment zone due to the amended groundwater injection. The temporary degradation allowed by this Order is consistent with Resolution No. 68-16 since (1) the purpose is to accelerate and enhance remediation of groundwater pollution and such remediation will benefit the people of the state; (2) the discharge facilitates a project to evaluate the effectiveness of cleanup technology in accord with Resolution No. 92-49; (3) the degradation is limited in scope and duration; (4) best practicable treatment and control, including adequate monitoring and hydraulic control to assure protection of water quality, are required; and (5) the discharge will not cause WQOs to be exceeded beyond the treatment area or project duration, as defined in Finding No. 22.

53. As described in the Basin Plan, groundwater cleanup goals range between background concentrations to the water quality objectives (WQO), unless background for naturally occurring constituents is higher than the WQO, in which case the cleanup goals are the background concentrations. For this site, the background concentrations for VOCs are the detection limits, since these compounds are not known to be present upgradient of the site. For some pollutants, ions, metals, and other by-products associated with the injection of any organic substrates, nutrients, anaerobic bacteria, NS-ZVI, dissolved methane/propane, or oxygen at the site, background concentrations may need to be developed or may be represented by baseline concentrations (Finding No. 45). The applicable WQO is the narrative toxicity objective. Numerical limits in this Order implement the narrative toxicity objective. The following are the WQOs for VOCs present at this site: (Table in Order lists the VOCs present with corresponding WQOs) :

Constituent	WQO	Reference
1,1,1-trichloroethane	17 ug/L	One-in-a-million Incremental Cancer Risk Estimate for Drinking National Academy of Sciences Health Advisory
1,2 dichloroethane	0.4 ug/L	California Public Health Goal in Drinking Water
Cis 1,2-dichloroethene	6.0 ug/L	California Department of Health Services Primary MCL
Trichloroethene	0.8 ug/L	California Public Health Goal in Drinking Water
Tetrachloroethene	0.06 ug/L	California Public Health Goal in Drinking Water
Vinyl Chloride	0.05 ug/L	California Public Health Goal in Drinking Water

MCL = Maximum Contaminant Level

54. Section 13267(b) of California Water Code provides that:

> In conducting an investigation specified in subdivision (a), the Regional Water Board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the Regional Water Board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the Regional Water Board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.
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> The technical reports required by this Order and the attached MRP No. R5-2007-0089, are necessary to assure compliance with these WDRs. The Discharger owns and operates the facility that discharged the waste subject to this Order.

55. Section 3020(b)(2) of the Resource Conservation and Recovery Act (RCRA) states that prior to injection into or above an underground source of drinking water, contaminated groundwater shall be "…treated to substantially reduce hazardous constituents prior to such injection." In a

letter dated 10 December 1999, the United States Environmental Protection Agency, Office of Solid Waste and Emergency Response (OSWER) states, "if extracted groundwater is amended at the surface (i.e., "treated") before reinjection, and the subsequent in-situ bioremediation achieves a substantial reduction of hazardous constituents the remedy would satisfy Section 3020(b)(2)." Therefore, the injection of groundwater within the treatment zone at this site, with or without the treatment for VOCs, complies with Section 3020(2)(b) of RCRA.

56. The California Department of Water Resources sets standards for the construction and destruction of groundwater wells, as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 74-81* (December 1981). These standards, and any more stringent standards adopted by the State or Solano County pursuant to California Water Code Section 13801, apply to all monitoring wells.

57. Issuance of this Order is an action to assure the restoration of the environment and is, therefore, exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21000, et seq.), in accordance with Section 15308 and 15330, Title 14, California Code of Regulations (CCR).

58. This discharge is exempt from the requirements of *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* as set forth in Title 27, CCR, Section 20005, et seq., (hereafter Title 27), which allows a conditional exemption from some or all of the provisions of Title 27. The exemption pursuant to Section 20090(b), is based on the following:

    a. The Regional Water Board is issuing waste discharge requirements,
    b. The discharge complies with the Basin Plan, and
    c. The wastewater does not need to be managed according to Title 22 CCR, Division 4.5, and Chapter 11, as a hazardous waste.

    Section 20090(d) allows exemption for a project to clean up a condition of pollution that resulted from an unauthorized release of waste based on the following:

    d. The cleanup and abatement action is under the direction of a public agency;
    e. Wastes removed from the immediate place of release will be discharged according to the Title 27 regulations; and

f. The remedial actions intended to contain wastes at the place of release shall implement the Title 27 regulations to the extent feasible.

59. Pursuant to California Water Code Section 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.

60. All the above and the supplemental data and information and details in the attached Information Sheet, which is incorporated by reference herein, were considered in establishing the following conditions of discharge.

61. The Discharger and interested agencies and persons were notified of intent to prescribe WDRs for this discharge and provided with an opportunity for a public hearing and an opportunity to submit written views and recommendations.

62. In a public meeting, all comments pertaining to the discharge were heard and considered.

IT IS HEREBY ORDERED that Order No. 5-00-131 is rescinded, and pursuant to Sections 13263 and 13267 of the California Water Code, Univar USA Inc. and the River City Baseball Group, their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder, shall comply with the following while conducting the above-described enhanced bioremediation groundwater pump and treat system:

[Note: Other prohibitions, conditions, definitions, and some methods of determining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated 1 March 1991, incorporated herein.]

A. Discharge Prohibitions

1. Discharge of wastes or pollutants to surface waters or surface water drainage is prohibited.

2. Discharge of sodium lactate, potassium phosphate, NS-ZVI, propylene glycol, dissolved methane/propane, or hydrogen peroxide, at locations or in a manner different from that described in Finding Nos. 21 through 36 is prohibited.

3. Discharge of waste classified as 'hazardous' under Section 2521 of Title 23, CCR, or as 'designated' under Section 13173 of California Water Code is prohibited.

4. Discharge of treated groundwater at locations or in a manner different from that described in Finding Nos. 21 through 36 is prohibited.

5. Neither the treatment nor the discharge shall cause a nuisance or condition of pollution as defined by California Water Code, Section 13050, outside the treatment zone and transition area.

6. Implementation of any new mode of full system operation is prohibited until the report (Baseline Summary Report) required in Provision E.4.a has already been submitted and concurred with by Regional Water Board staff.

B. Discharge Specifications

1. No waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of the Effluent Limitations or the Groundwater Limitations listed below.

2. The Discharger shall provide hydraulic control within the treatment area of any groundwater contaminants, amendments, and by-products of the in-situ treatment process (including any daughter products of the PCE and TCE) during and after injection of any amended groundwater. The Discharger shall continue to provide hydraulic control while injection and cleanup are ongoing.

3. The Discharger shall not cause the permeability of the aquifer, either inside or outside of the treatment area, to be affected to such a degree that the Discharger is unable to effectively operate extraction wells for the purpose of containing the substrate and or its byproducts.

4. Treated, unamended groundwater shall only be injected through trenches and/or injection wells outside the groundwater capture zone during the in-situ bioremediation program.

5. Discharge of amendments and amended groundwater shall be limited to the project scope as described in Finding Nos. 21 through 36.

C. Effluent Limitations

1. The effluent shall not have a pH of less than 6.5 or greater than 8.4.

2. The discharge of effluent outside the in-situ treatment groundwater capture zone in excess of the following limits is prohibited:

Constituent	Units	30-Day Average	Daily Maximum	Maximum Detection Limit[1]
1,2 dichloroethane	ug/L	<0.5	1.0	0.5
Cis 1,2-dichloroethene	ug/L	<0.5	1.0	0.5
Trichloroethene	ug/L	<0.5	1.0	0.5
Tetrachloroethene	ug/L	<0.5	1.0	0.5
Chloroform	ug/L	<0.5	1.0	0.5
Total Volatile Organic Cmps[2]	ug/L	<0.5	1.0	0.5
Total Petroleum Hydrocarbons	ug/L	<0.5	1.0	0.5

[1] For nondetectable results
[2] Total of all Volatile Organic Compounds (VOCs).

3. If the target constituents are detected above the 30-day average concentration limits in Effluent Limitation C.2., the Discharger shall obtain a confirmation sample within 24 hrs. of receiving the results and cease discharging until it can be confirmed the analytical results of the confirmation sample are below the effluent limits listed above. If an exceedence is confirmed, the Discharger shall replace the carbon in all three GAC vessels and retest within 72 hours of restarting the system which shall occur within 60 days of receipt of the confirmed exceedence. If the results of the retest show compliance with effluent limits, treatment system operations may resume.

D. Groundwater Limitations

1. The Discharger shall not cause the amendments or by-products of the in-situ treatment process, as defined in Finding Nos. 21 through 36, to migrate outside of the treatment area during the in-situ bioremediation program.

2. The Discharger shall not cause the groundwater outside the treatment area to contain taste and odor producing substances that cause nuisance or adversely affect beneficial uses.

3. The Discharger shall not cause the groundwater outside the treatment area to contain concentrations of chemical constituents, including the amendments and by-products of the in-situ treatment process, in amounts that adversely affect municipal, domestic, industrial or agricultural uses.

E. Provisions

1. The Discharger shall notify Regional Water Board staff a minimum of two weeks prior to the startup of a new mode of operation of the enhanced bioremediation pump and treat system.

2. The Discharger shall comply with the attached MRP No. R5-2007-0089, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

3. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements," dated 1 March 1991, which are attached hereto and are by reference a part of this Order. This attachment (Attachment D) and its individual paragraphs are commonly referenced as "Standard Provision(s)."

4. All of the following reports shall be submitted pursuant to Section 13267 of the California Water Code. All technical reports required herein that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1. To demonstrate compliance with sections 415 and 3065 of Title 16, CCR, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.

    a. The Discharger shall submit a Baseline Summary Report due no later than **60 days** after collection of baseline samples. The Baseline Summary Report shall include a proposal for baseline values for all Suite A, B, C and D constituents listed in MRP No. R5-2007-0089, as described in Finding No. 45. The report shall include a discussion of any statistical method used to calculate baseline concentration ranges.

The Discharger shall not begin injection using a new mode of operation (Finding No. 27) until receiving written approval of Regional Water Board staff.

b. The Discharger shall submit a Start-up/Capture Zone Analysis Report no later than **90 days** after beginning any new mode of operation set forth under this Order evaluating the first 60 days of extraction and injection that shall include a description of the system extraction/injection configurations and groundwater flow conditions, an assessment of the capture zone and the estimated travel times and paths of injected groundwater, quantities and locations of amendments and amended groundwater injected, and results of the first month of monitoring. The discharge will be prohibited if the assessment shows that groundwater and/or amendments injected into the treatment zone are not captured. The Discharger may vary the amount of groundwater extracted and/or injected to enhance degradation or to maintain hydraulic control within the treatment zone provided the Specifications, Provisions, and Prohibitions of this Order are not violated. Any variances of the proposed mode of operation will require the approval of the Executive Officer.

c. The Discharger shall submit a Bioremediation Assessment Report no later than **20 months** after beginning any new mode of operation set forth under this Order that shall include a summary of analytical results and an evaluation of the effectiveness of the injections. The Bioremediation Assessment Report shall include a summary of the amended groundwater injection and/or recirculation locations, volumes and rates, treatment system influent and effluent sampling results, and a discussion of rates of electron donor consumption, amendment dosages, permanence of PCE, and PCE breakdown product removal and attenuation of byproducts and nutrients. If the Executive Officer finds that the bioremediation process has not created conditions conducive to dechlorination and sufficient breakdown of contaminants, all further discharges of amendments will be prohibited and the Discharger shall submit an alternative groundwater extraction and treatment remedial plan within 30 days of this determination by the Executive Officer.

d. The Discharger shall submit an evaluation of the in-situ bioremediation process in each quarterly groundwater monitoring report submitted after the first injection of amended groundwater under any new mode of operation. The reports shall include an evaluation of the effectiveness of using groundwater amendments to supplement the pump and treat remediation of VOC contaminated groundwater at the facility, any

alterations in the amendment additions from the previous quarter, the impact of any by-products on the receiving groundwater, and any other effects the in-situ treatment may have. The reports shall also include recommendations for any changes in amendment addition. Alternative amendment addition or mode of operation shall only be implemented upon written approval of the Executive Officer.

5. Prior to any modifications that would result in material change in the quality or quantity of substrate discharge, or any material change in the character, location, or volume of discharge, the Discharger shall report all pertinent information in writing to the Regional Water Board staff for review. The attached MRP and /or this Order may be revised prior to implementation of any modifications.

6. Should evaluation of the bioremediation process reveal adverse effects on groundwater quality that were not anticipated, the Discharger shall notify Regional Water Board staff within 24 hours of detection of the adverse effect, followed by a written summary within two weeks. The Discharger shall clean up and abate these effects pursuant to an abatement plan approved by Regional Water Board staff.

7. The Discharger shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Water Board or court order requiring corrective action or imposing civil monetary liability, or in a revision or rescission of this Order.

8. The Discharger shall maintain records of all monitoring information, including all calibration and maintenance records, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of three years from the date of the sample, measurement, or report. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer.

9. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control that are installed or used by the Discharger to achieve compliance with this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are to be installed by the Discharger only when necessary to achieve compliance with the conditions of this Order.

10. The Discharger shall report any non-compliance, and/or accidental spill or release of liquid or material verbally to the Regional Water Board within 24 hours of the spill or release, and follow-up the verbal notification with written documentation of the spill or release within 14 calendar days of the incident.

11. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

12. The Discharger shall provide a water supply replacement evaluation report within **30 days** if the operation of the groundwater treatment and recirculation system affects any water supply well. The Report shall identify immediate and long-term water replacement options.

13. While this Order is in effect, and prior to any change in ownership of the Site or management of this operation, the Discharger shall transmit a copy of this Order to the succeeding Owner/Operator, and forward a copy of the transmittal letter and proof of transmittal to the Regional Water Board. Transfer of privileges granted under this Order is subject to the discretion of the Executive Officer.

14. The Regional Water Board will review this Order periodically and will revise requirements when necessary.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 22 June 2007.

Ordered by: _____
PAMELA C. CREEDON, Executive Officer

KAB: 6/26/07

Attachments

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2007-0089
FOR
UNIVAR USA, INC. (FORMER VAN WATERS AND ROGERS, INC.) AND
RIVER CITY BASEBALL GROUP
FORMER VAN WATERS AND ROGERS FACILITY/RALEY FIELD
WEST SACRAMENTO
YOLO COUNTY

This Monitoring and Reporting Program (MRP) describes requirements for monitoring a groundwater extraction and treatment system. This MRP is issued pursuant to Water Code Section 13267. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. Regional Board staff shall approve specific sample station locations prior to implementation of sampling activities.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

GROUNDWATER MONITORING

As shown on Attachment B, there are 22 monitor wells, five extraction/gradient control wells (GC-5, GC-6, GC-7, GC-8, & GC-9), two combination gradient control/vapor extraction wells (GCVE-1, GCVE-2), and three injection trenches (Trenches 1, 2, and 3) associated with this site. The groundwater monitoring program for these wells and any wells installed subsequent to the issuance of this MRP, shall follow the schedule below. Monitor wells with free phase petroleum product or visible sheen shall be monitored, at a minimum, for product thickness and depth to water. The volume of extracted groundwater also shall be provided in quarterly monitoring reports. Sample collection and analysis shall follow standard EPA protocol.

Performance of the recirculation system will be assessed by the decline of VOC concentrations in the groundwater monitoring wells inside and along the boundary of the treatment zone. The Discharger will demonstrate that continued containment and cleanup is being achieved within the transition area surrounding the treatment zone by measuring groundwater levels and constituent concentrations in compliance monitoring wells, MR-9, MW-16, MW-18, MW-20, MW-22, as specified below.

The monitor wells, extraction wells and/or injection wells shall be sampled according to the schedule in Table 1 and the samples analyzed by the methods in Table 2, as follows:

Table 1: SAMPLING REQUENCY AND CONSTITUENT SUITE[1]

Well Number	Quarterly[2]	Semi-Annually[3]	Annually[4]	Monitoring Objective
MR-1	--------	--------	Suites A, B, C, D	Transition Area[5]
MR-2	--------	--------	Suites A, B and C	Treatment Zone[6]

Well Number	Quarterly[2]	Semi-Annually[3]	Annually[4]	Monitoring Objective
MR-3	Suite A	Suites B and C	--------	Treatment Zone[6]
MR-4	--------	--------	Suites A, B, C, D	Treatment Zone[6]
MR-5	Suite A	Suites B and C	--------	Treatment Zone[6]
MR-5D	--------	Suite A	--------	Treatment Zone[6]
MR-6	--------	--------	Suites A, B, C, D	Transition Area[5]
MR-6D	--------	--------	Suites A, B, C, D	Transition Area[5]
MR-7	--------	Suite A	Suites B and C	Treatment Zone[6]
MR-8A	--------	--------	Suites A, B, C, D	Transition Area[5]
MR-9	--------	--------	Suites A, B, C, D	Migration[7]
GCVE-1	Suite A	Suites B and C	--------	Treatment Zone[6]
GCVE-2	Suite A	Suites B and C	--------	Treatment Zone[6]
GC-5	--------	Suite A	Suites B, C, D	Transition Area[5]
GC-6	--------	Suite A	Suites B, C, D	Transition Area[5]
GC-7	Suite A	Suites B and C	--------	Treatment Zone[6]
GC-8	--------	Suite A	--------	Treatment Zone[6]
GC-9	--------	Suite A	--------	Treatment Zone[6]
MW-7	Suite A	Suites B and C	--------	Treatment Zone[6]
MW-13	--------	--------	Suites A, B, C, D	Treatment Zone[6]
MW-14	--------	--------	Suites A, B, C, D	Transition Area[5]
MW-15	--------	--------	Suites A, B, C, D	Transition Area[5]
MW-16	--------	--------	Suite A	Migration[7]
MW-17A	--------	Suite A	--------	Transition Area[5]
MW-18	--------	--------	Suite A	Migration[7]
MW-20	--------	--------	Suite A	Migration[7]
MW-21	--------	Suite A	--------	Treatment Zone[6]
MW-22	--------	--------	Suite A	Migration[7]
New Wells[8]	Suite A	--------	--------	--------

[1] Wells shall be sampled for the constituents in Suites A, B, C and D as specified in Table 2. Analysis of the samples shall be conducted using the methods specified in Table 2.

[2] All wells and on-site trenches shall be monitored at least quarterly and immediately following any abrupt significant change (greater than 2 feet) in the Sacramento River stage for water levels to determine and report groundwater flow direction.

[3] Wells shall be sampled semi-annually during the second and fourth quarters.

[4] Wells shall be sampled annually during the fourth quarter.

[5] Wells sampled to evaluate changes in water quality along the treatment zone boundary and in the transition area.

[6] Wells sampled to evaluate in-situ bioremediation progress inside the treatment zone.

[7] Wells sampled to evaluate potential migration of pollutants outside of treatment zone and transition area.

[8] Prior to construction of any new wells or destruction of any wells, the Discharger shall submit plans and specifications to the Regional Water Board staff for approval. All new wells shall be added to he monitoring program and sampled as specified above using the methods specified in Table 2.

Table 2: ANALYTICAL METHODS

Constituent	Method[1]	Maximum Practical Quantitation Limit (µg/L)[2]
Suite A		
Volatile Organic Compounds	EPA 8020 or 8260B	0.5
Sodium	EPA 200.7	1,000
Potassium	EPA 200.7	1,000
Suite B		
Volatile Organic Acids	EPA 6500	1,000
Orthophosphate	Hach Method 8131	30
Suite C		
Ethane	Modified EPA 602	0.1
Ethene	Modified EPA 602	0.1
Methane	Modified EPA 602	0.1
Total Dissolved Solids	EPA 160.1	10,000
Chloride	EPA 6500	300
Nitrate	EPA 6500	300
Sulfate	EPA 6500	200
Sulfide	Hach Method 8131	30
Metals, Dissolved[3]	EPA 200.7, 200.8	Various
Suite D[4]		
Ethylene Glycol	EPA 1666, 1671	200,000
Boron	EPA 200.7 or 6010B	50

[1] Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

[2] All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as an estimated value All wells and on-site trenches shall be monitored at least quarterly and immediately following any abrupt significant change (greater than 2 feet) in the Sacramento River stage for water levels to determine and report groundwater flow direction.

[3] Metals include barium cadmium, calcium, total chromium, copper, lead, magnesium, manganese, mercury, molybdenum, nickel, silica, and iron (dissolved).

[4] Wells shall be sampled for the constituents in Suite D, as specified in Table 1 after approval and during implementation of the third mode of system operation.

In addition, baseline samples must be collected from all monitor wells, and analyzed for the consitutents in Suites A, B, C and D, a minimum of two weeks prior to any injection into the treatment area using any new mode of operation that has been approved.

Field Sampling

In addition to the above sampling and analysis, field sampling and analysis shall be conducted each time a monitor well or extraction well is sampled. The sampling and analysis of field parameters shall be as specified in Table 3.

Table 3: FIELD SAMPLNG REQUIREMENTS

Parameters	Units	Type of Sample
Groundwater Elevation	Feet, Mean Sea Level	Grab
Oxidation-Reduction Potential	Millvolts	Grab
Electrical Conductivity	uhmos	Grab
Dissolved Oxygen	mg/L	Grab
pH	pH Units (to 0.1 units)	Grab

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the “Reporting” section of this MRP.

TREATMENT SYSTEM MONITORING

During normal operations the treatment system shall be monitored as described below. The initial sample must be collected within 24-hours after commencing operation of the treatment system and subsequent sampling will follow the requirements specified in Tables 4 and 5. If a new mode of operation is approved, then initial sampling shall once again take place within 24 hours following startup under the new operation mode.

Influent Monitoring

During regular operation samples for influent monitoring shall be collected at a point prior to the lead GAC vessel at each of the groundwater treatment facilities. Influent monitoring shall be as specified in Table 4:

Table 4: Treatment System Influent Monitoring

Constituent	Units	Type of Sample	Sampling Frequency
Influent Flow	gpm	Meter	Continuously
Monthly Average Daily Flow	gpd	Calculated	Monthly
VOCs[1]	ug/l	Grab	Monthly
pH[2]	pH units	Grab	Monthly

[1] Volatile organic contaminants by EPA Method 8260 or 601/602, or an equivalent method with a reporting limit of no greater than 0.5 µg/l. Values between the detection level and the reporting level should be reported as trace.
[2] Field Measurement. See requirements above for field sampling.

Effluent Monitoring

During regular operation effluent samples shall be collected after the final treatment unit, before discharge and shall be representative of the volume and nature of the discharge. Effluent monitoring shall be as specified in Table 5.

Table 5: Treatment System Effluent Monitoring

Constituent	Units	Type of Sample	Sampling Frequency
Effluent Flow	gpm	Meter	Continuously
Monthly Average Daily Flow	gpd	Calculated	Monthly
VOCs[1]	ug/l	Grab	Monthly
VOCs[1] between GAC Vessels (after secondary mid-vessel)	ug/L	Grab	Every Two Months
pH[2]	pH units	Grab	Monthly
Sodium	mg/L	Grab	Quarterly
Total and Dissolved Iron	ug/L	Grab	Quarterly
Electrical Conductivity[2]	uhmos	Grab	Monthly
Dissolved Oxygen[2]	mg/L	Grab	Monthly
Oxidation-Reduction Potential[2]	uhmos	Grab	Monthly

[1] Volatile organic contaminants by EPA Method 8260 or 601/602, or an equivalent method with a reporting limit of no greater than 0.5 µg/l. Values between the detection level and the reporting level should be reported as trace.

[2] Field Measurement. See requirements above for field sampling.

REPORTING

When reporting the data, the Discharger shall arrange the information in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. In addition, the Discharger shall notify the Regional Board within 48 hours of any unscheduled shutdown of any soil vapor and/or groundwater extraction system. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Regional Board.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

The Discharger shall submit quarterly electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The quarterly reports shall be submitted electronically over the internet to the Geotracker database system by the 1st day of the second month following the end of each calendar quarter by **1 February, 1 May, 1 August, and 1 November** until such time as the Executive Officer determines that the reports are no longer necessary.

Quarterly reports shall be submitted to the Regional Board by the **1st day of the second month following the end of each calendar quarter (i.e., by 1 February, 1 May, 1 August, and 1 November**) until such time as the Executive Officer determines that the reports are no longer necessary. Each quarterly report shall include the following minimum information:

(a) a description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants and groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated;

(b) field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, etc.;

(c) groundwater contour maps for all groundwater zones, if applicable;

(d) isocontour pollutant concentration maps for all groundwater zones, if applicable;

(e) a table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom;

(f) a table showing historical lateral and vertical (if applicable) flow directions and gradients;

(g) cumulative data tables containing the water quality analytical results and depth to groundwater;

(h) a copy of the laboratory analytical data report;

(i) if applicable, the status of any ongoing remediation, including cumulative information on the mass of pollutant removed from the subsurface, system operating time, the effectiveness of the remediation system, and any field notes pertaining to the operation and maintenance of the system; and

(j) if applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions; and

(k) A log of GAC replacement, along with transportation date(s) and destination of disposal.

An Annual Report shall be submitted to the Regional Board by **1 February (1 November for semi-annual monitoring)** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation, and may be substituted for the fourth quarter **(or second semi-annual)** monitoring report. The Annual Report shall contain the following minimum information:

(a) both tabular and graphical summaries of all data obtained during the year;

(b) groundwater contour maps and pollutant concentration maps containing all data obtained during the previous year;

(c) a discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;

(d) an analysis of whether the pollutant plume is being captured by an extraction system or is continuing to spread;

(e) a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the pollutants, and plans to improve remediation system effectiveness;

(f) an identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and

(g) if desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

A letter transmitting the self-monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory.

The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by: _____
PAMELA C. CREEDON, Executive Officer

22 June 2007
(Date)

06/26/07:KAB

INFORMATION SHEET

ORDER NO. R5-2007-0089
UNIVAR USA INC. AND RIVER CITY BASEBALL GROUP
RALEY FIELD/FORMER VAN WATERS & ROGERS FACILITY SITE
GROUNDWATER TREATMENT AND DISPOSAL SYSTEM
WEST SACRAMENTO, YOLO COUNTY

Univar USA Inc. (Formerly Van Waters & Rogers) operates an existing bioremediation groundwater treatment and disposal system at its former West Sacramento chemical distribution center, currently occupied by the Raley Field Ballpark. The property owner is River City Baseball Group, the current owner and operator of the ballpark facility, a new multi-use 14,000 seat open-air structure stadium facility, that serves as the home of the Sacramento River Cats, the Triple A affiliate of the Oakland Athletics.

Past chemical distribution operations at the Site resulted in solvents, volatile organic compounds (VOCs) such as tetrachlorethene (PCE), trichloroethene (TCE), cis-1,2-DCE and trans-1,2-DCE pollution in soil and groundwater. Cleanup systems for the soil and groundwater were incorporated into the stadium design during construction of Raley Field as part of redevelopment of the 15-acre site in 2000. Van Waters & Rogers operated a soil vapor extraction/air sparge (SVE/AS) system from February 1995 until 1997 to remediate VOCs that may have caused groundwater mounding of the water table beneath the facility and exacerbated offsite migration of VOCs. The highest on-site groundwater VOC concentrations ranged from 2000 to 3000 ug/l in 1999 when Van Waters and Rogers decommissioned the air sparging system and proposed a combination of SVE, groundwater extraction, and enhanced in-situ bioremediation as the preferred remedial alternative for the site.

On 16 June 2000, the Regional Water Board issued Waste Discharge Requirements Order No. 5-00-131 for enhanced in-situ bioremediation, including extraction, treatment, and injection of groundwater amended with a food source and nutrients to stimulate the growth of indigenous bacteria to contain and remediate groundwater containing the VOCs.

Since September 2000, the Discharger has operated an enhanced in-situ bioremediation groundwater treatment and disposal system that re-injects treated or amended groundwater extracted from the aquifer using five groundwater extraction (gradient control (GC)) wells, two combination gradient control/vapor extraction (GCVE) wells, and three injection trenches (Trenches 1, 2 & 3). Extracted groundwater is treated using three above ground liquid–phase granular activated carbon units. Associated piping and instrumentation was used to re-inject treated groundwater outside the in-situ treatment zone areas for containment and to re-inject amended groundwater

to remediate contaminated groundwater within the in-situ treatment zone. After demonstrating that hydraulic capture was achieved within the treatment zone, the Discharger was allowed to inject untreated (i.e. groundwater containing VOCs) into the treatment zone to enhance the effects of in-situ bioremediation at the site. The existing remediation system also includes 22 groundwater monitoring wells. Since 2000, the Discharger has also continued to operate the SVE portion of the system consisting of five vapor extraction (VE-1R, VE-2R, VE-3R, VE-6, & VE-7) wells and the GCVE wells.

The Discharger amended the extracted groundwater with a food source (sodium lactate), nutrients (potassium phosphate), and anaerobic bacteria (microorganisms), to enhance the growth of indigenous (i.e. native to the Central Valley or San Joaquin-Sacramento River Delta areas of California) anaerobic bacteria capable of breaking down the VOC contaminants to carbon dioxide, water, and chlorides via a reductive dechlorination process. In the event that the breakdown to carbon dioxide, water, and chlorides was not sufficiently enhanced, the remedial system also functioned as a groundwater extraction, treatment, and capture system.

This Order rescinds and replaces WDR Order No. 5-00-131, and regulates modifications using different modes of operation of the groundwater recirculation system to enhance biodegradation of the VOCs within the groundwater treatment/containment zone to accelerate the cleanup.

Evaluation of historic groundwater data demonstrates that most of the significant groundwater quality improvements occurred during the first few years (2001 and 2002) of system operation. There are two identified groundwater bearing zones. First encountered groundwater at the Site is about 10 feet below ground surface (bgs). A second water bearing zone is about 75 feet bgs. Most of the mass of VOC pollution remains in the shallow water bearing where total VOC concentrations above 100ug/l are reported to remain in three relatively discrete areas of the site. These three areas are in the vicinity of wells MR-3 and MR-7, GCVE-1, and GCVE-2.

The regional groundwater flow direction in the area of the Site is influenced by the stages of the Sacramento River. The significant changes in the river stage have historically occurred on a seasonal basis (i.e. early winter and spring). Depth-to-water measurements were made in the site monitoring wells during these changes in river stage to confirm if groundwater flow direction change also occurred.

The Discharger will continue to operate the groundwater treatment system in two main extraction/injection configurations depending upon the regional groundwater flow regime.

Historical soil vapor and SVE System operation data indicates that remediation of the pollutants in soil vapor at the site is complete. The Discharger may decommission the SVE system in the future. In the interim, the Discharger may use the decommissioned vapor extraction wells as additional injection points to improve the distribution of amendments in the groundwater treatment zone. A continuous low rate of injection (one gallon per minute) is proposed at these locations to percolate amended groundwater through the vadose zone (0 to 7 feet) and reach the water table. This low injection rate is not expected to affect groundwater capture.

The treatment zone will consist of an in-situ recirculation system using gradient control wells (GCVE-1, GCVE-2, GC-5, GC-6, GC-7, GC-8, & GC-9) to provide hydraulic control of added amendments in the shallow zone surrounding Trench 1 and Trench 2 and the VE wells located directly above the layout of the former VW&R Facility. In addition to the injection trenches and VE wells, wells GCVE-1, GCVE-2, and the GC wells, with the exception of GC-5 where year round extraction is proposed to continue, will be used as injection points during portions of the year when these wells are not being used for groundwater extraction.

The treatment zone boundary is defined by the former VW&R property boundary. Up to approximately 90 gallons per minute (gpm)) groundwater will be extracted and up to approximately 8.5 gpm of amended groundwater per day will be injected within the in-situ treatment zone. Up to approximately 65 gpm of unamended treated groundwater per day will be injected outside the treatment zone. Performance of the recirculation system will be assessed by monitoring groundwater levels, and the decline of VOC concentrations, in the groundwater monitoring wells located in the treatment zone area. The Discharger will continue the extraction of groundwater and discharge treated amended groundwater until the VOCs have been reduced below cleanup goals or the system is no longer effective at reducing VOC concentrations.

The Discharger proposes to initially continue the extraction and injection of groundwater amended with sodium lactate, potassium phosphate, and anaerobic bacteria, to enhance the growth of indigenous bacteria capable of breaking down the VOC contaminants to carbon dioxide, water, and chlorides via a reductive dechlorination process. During reductive dechlorination, anaerobic microorganisms substitute hydrogen for chlorine on the organic compound. The chlorine is the electron acceptor and carbon is the main electron donor. PCE is

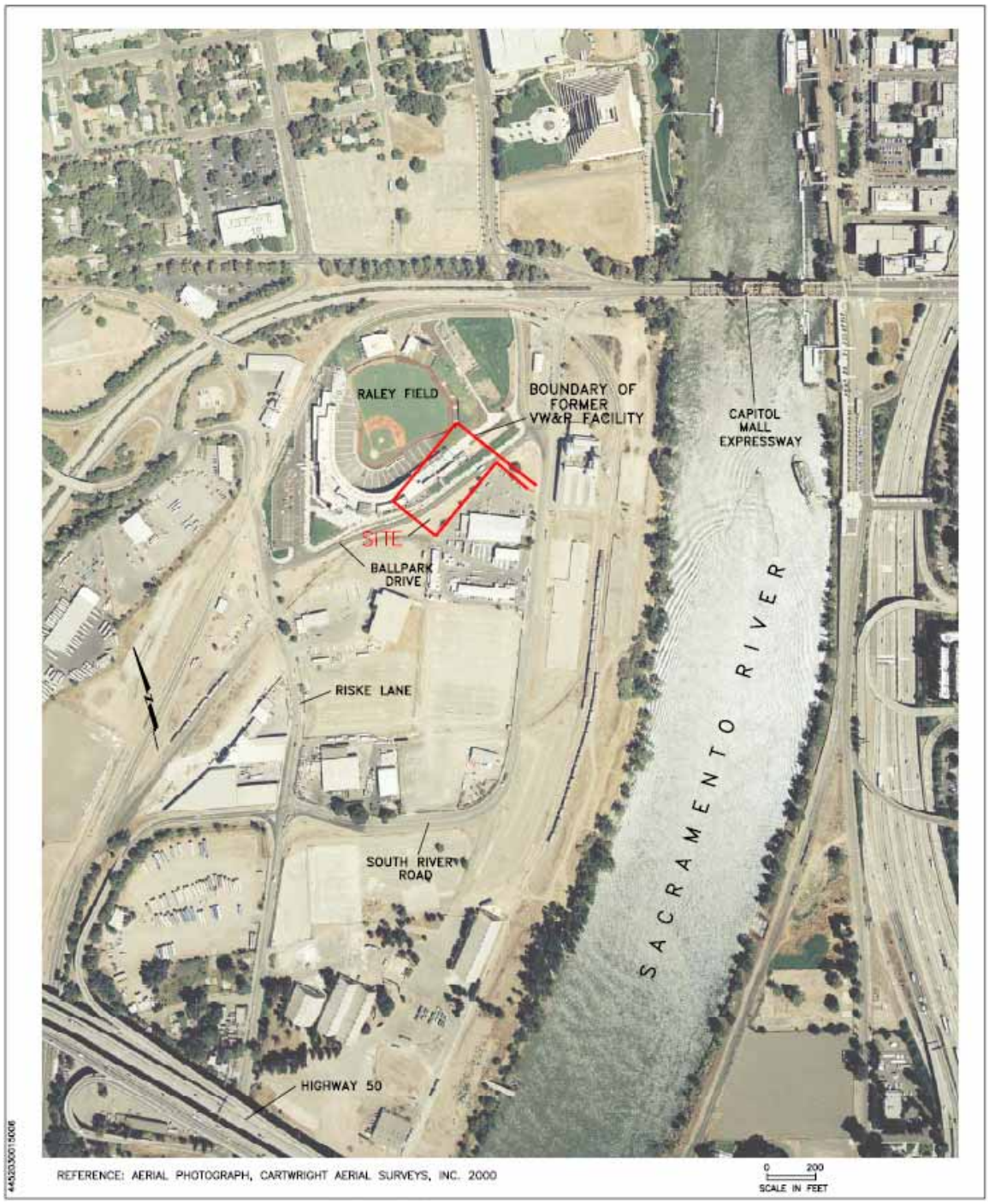
reduced to trichloroethene (TCE), then cis-1,2-DCE, then VC, then ethene. Injecting a food source to stimulate growth of indigenous anaerobic microorganisms provides a carbon substrate, therefore accelerating the reductive dechlorination process. PCE and TCE degrade best under anaerobic conditions, but cis-1,2-DCE and VC degrade best under aerobic conditions. Despite this, cis-1,2-DCE and VC should still be reduced by the indigenous microorganisms once the PCE and TCE are reduced because it will be the next available source for the anaerobic microorganisms to substitute hydrogen for chlorine. In the event that the breakdown to carbon dioxide, water, and chlorides is not sufficiently enhanced, additional modes of system operation will be used and the remedial system will also continue to function as a groundwater extraction, treatment, and capture system.

The Discharger will sample groundwater and submit a Baseline Summary Report that establishes baseline concentrations for VOCs, metals and indicator parameters before beginning any new mode of operation and injecting any increased amounts of groundwater amendments. In the event that VOC or breakdown products persist in groundwater in the vicinity of wells MR-3, GCVE-1 or GCVE-2 under the first mode of operation, the Discharger may install an additional shallow extraction well to improve amendment distribution. If VOC concentrations persist, the Discharger will implement a supplemental second mode of operation to further enhance the aerobic dechlorination process. This second mode of operation will consist of adding appropriate batches of nano-scale zero valent iron (NS-ZVI) as a slurry to extracted groundwater and re-injecting this amended groundwater into particular areas within the treatment zone.

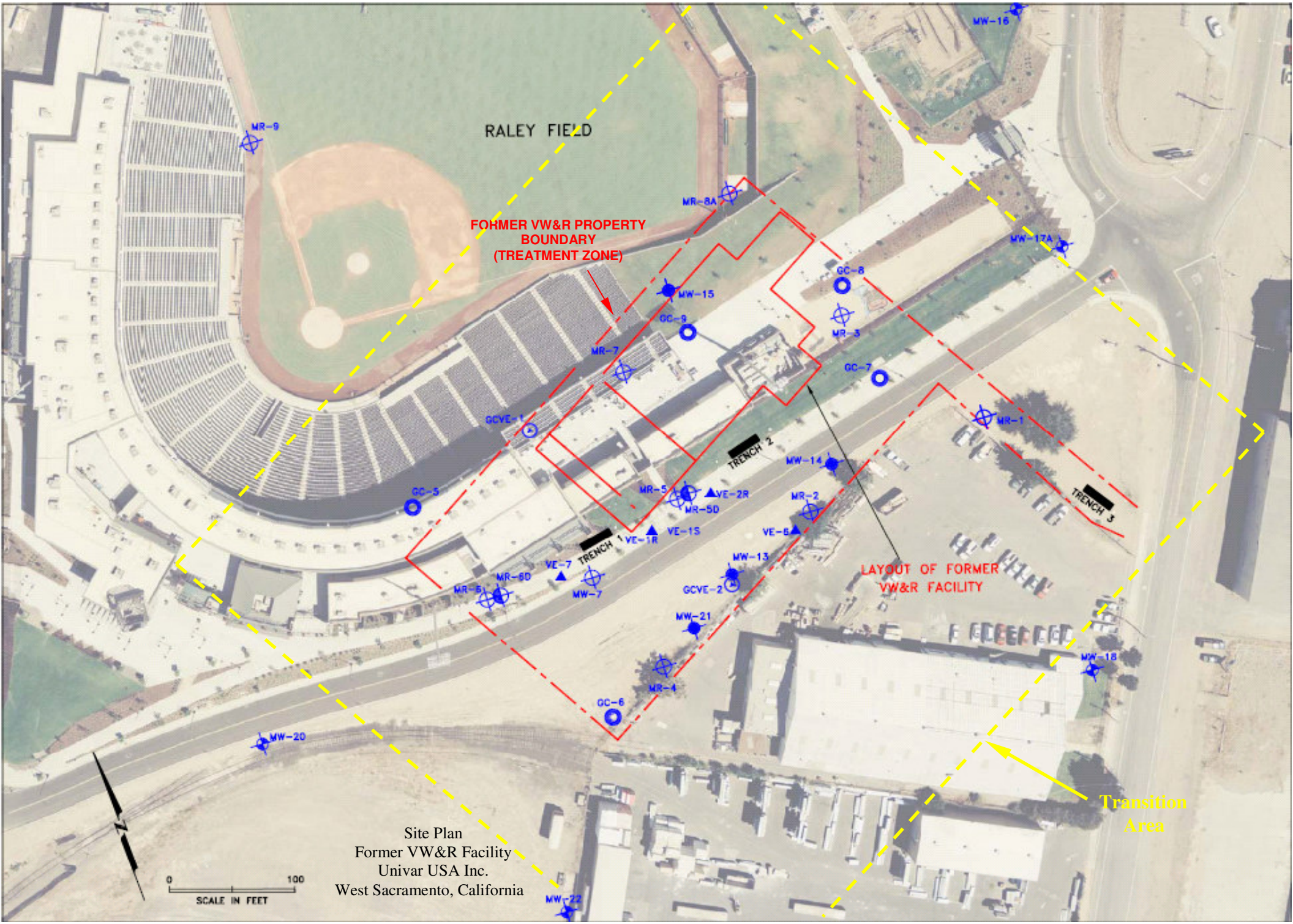
In the event that total VOCs or the daughter-product chlorinated hydrocarbons, including but not limited to TCE, cis-1,2-DCE, and VC, persist at concentrations deemed to low to sustain further degradation by anaerobic dechlorination in a particular area of the treatment zone, the Discharger will cease adding electron donor amended groundwater in that area and upon approval, implement a third mode of operation that will change the subsurface condition in these areas to aerobic. The Discharger will conduct microcosm tests to demonstrate that the proposed change in operation is applicable to the proposed area of site groundwater and that it is expected to be effective in expediting groundwater cleanup. This third mode of operation will cease the reduction of the metals and other compounds, by adding appropriate doses of dissolved methane/propane and oxygen which is expected to provide for continued degradation of the remaining VOC pollution to ethylene and chloride.

KAB 6/26/07

Attachment A



Vicinity Map
Former VW&R Facility
Fourth Quarter 2005 Groundwater Monitoring
Univar USA Inc.
West Sacramento, California



Site Plan
Former VW&R Facility
Univar USA Inc.
West Sacramento, California

ATTACHMENT C

Proposed Injection Locations